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The use of patents for the protection of technological innovation:

A case study of selected Swedish firms

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The use of patents for the protection of technological innovation:

A case study of selected Swedish firms

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at the request of the UNCTAD secretariat[1]

1 This study was prepared, in co-operation with the UNCTAD secretariat, by Ove Granstrand, Professor of Chalmers University of Technology, Göteborg. The views expressed in the study do not necessarily reflect those of the UNCTAD secretariat.

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FOREWORD

(i) The Committee on Transfer of Technology, in section V, paragraphs 15 and 16 of its resolution 28 (V), requested the UNCTAD secretariat, in co-operation with other institutions concerned, to "continue its valuable studies of policies and instruments on the promotion and encouragement of technological innovation in all countries, and particularly in developing countries, taking into account the comments and views expressed at the fifth session of the Committee." According to the same resolution, the secretariat's studies should, *inter alia*, consider the influence which the following factors may have in promoting and creating an innovative environment:

(a) risk-taking in a changing, innovative environment;

(b) incentives required at all levels of society, including those provided by systems of industrial property protection;

(c) linkages, including feedback mechanisms, between research and development activities reflecting practical local endowments and conditions.

(ii) The present study has been prepared in response to sub-paragraph (b) above. It is a part of a wider research programme of the secretariat and focuses on the effectiveness of incentive schemes for promoting innovation. Besides the present study, two other studies dealing with incentives other than the industrial property system have been carried out: one on Spain and one on France.

(iii) The main purpose of the study is to assess the use of patents as a method for the protection of technological innovation in Swedish large and small technology-based firms. The study focuses on the firms' propensity to patent relative to other methods of intellectual property protection. In addition, the study analyses differences in patenting practices between large and small firms, and an attempt is made to reach a conclusion on possible patenting trends.

(iv) An empirical survey was carried out among 20 Swedish technology-based firms. Chapter I provides an introduction to the patent system in Sweden and describes the background of the survey. In chapter II, the role of patents in large firms is analysed. In chapter III, the same methodology is applied for small firms.

(v) In preparing the present study, the UNCTAD secretariat benefited from the collaboration of Professor Ove Granstrand of Chalmers University of Technology (Göteborg, Sweden) who carried out the empirical survey in Sweden and substantially contributed to the preparation of the report.

SUMMARY AND CONCLUSION

(vi) To assess the role of patents in Sweden's technology-based firms, an empirical survey based on structured interviews with 9 large and 11 small firms was carried out (for the text of the questionnaire, see the annex). Due to the narrowness of the sample, sector-specific conclusions could not be drawn. Consequently, the findings of the survey require careful interpretation. The main findings of the survey concern the firms' objectives with regard to patenting, the relative importance of patents as indicated by their limitations, patenting practices and future trends and the impact of the patent protection time on the firms' R and D behaviour.

(vii) In general, it was found that the firms strengthened or were planning to strengthen intellectual property protection as a result of various factors, e.g. increased competition, internationalization of economic activities and improved techniques for technological scanning. However, the survey did not provide indications for a significantly stronger reliance on patents, whereas secrecy policies were enforced with emphasis on the control of human resources. For both the large and the small firms, it was confirmed that patents were regarded as more appropriate for product innovation, while secrecy was considered to offer better protection for process innovation.

(viii) The objectives of patenting differed between large and small firms. For small firms, patents were of no significant relevance to prevent imitation. Such firms seem to rely more on secrecy and technological lead time. The purpose of patenting for the small firms that were engaged in patenting (5 out of 11), was mainly to create bargaining power in negotiations related to financing, licensing or co-operation. For large firms, patents are often viewed as an alternative to secrecy and the propensity to patent is a function of expectations. The firms tend to apply for patents in cases when reverse engineering is believed not to be costly and infringements could be easily detected. Another reason for patenting is when the enforcement of the patent law is regarded as effective. Still other reasons for patenting are government requirements for public disclosure (chemicals, agro-industry) and the collective behaviour of the firms, which causes firms to patent if one firm starts patenting in an area that was previously not covered by patents.

(ix) Regarding the effectiveness of the patent system, the firms regretted the lack of international standards and the limited effectiveness of patent protection. The implications of the public disclosure of relevant information with respect to imitation was regarded as a limiting factor for patenting by a few large chemical firms.

(x) The patenting practices of large and small firms were also found to differ considerably. Small firms have a higher number of patents per employee and per Swedish crowns spent on research. However, they also have a lower share of commercially exploited patents and a higher proportion of patenting costs of the total R and D expenditures. This indicates that small firms are relatively more innovative. Within the large firms, the chemical firms have a smaller commercial exploitation share of filed patents than engineering firms.

(xi) For large firms, commercial aspects of patents are of growing relevance. Decisions on whether to patent are increasingly influenced by commercial considerations. This could be, among other reasons, a result of attempts by a number of the firms to enter the United States market where the patent system is regarded as being more relevant. Also, screening procedures to assess unexploited patents are increasingly established as a response to rising patent fees.

(xii) Patents as an instrument to stimulate innovative activities appeared to be of little relevance for small firms. It was found that no significant changes in the R and D behaviour would take place if the patent protection time were reduced or extended. Also, for large firms, the R and D behaviour seems to be rather independent of the availability of patenting protection. The survey showed that increased patent protection time is likely to provide, at most, a modest stimulus for R and D activities. Chemical, and particularly pharmaceutical, firms appear to be more sensitive to such changes.

CHAPTER I

PATENT PROTECTION AND TECHNOLOGICAL INNOVATION IN SWEDEN

1. In nearly all countries, patent systems were established to promote inventive and innovative activities by granting inventors exclusive rights over the use of their inventions for a given period of time. A patent system represents only one of the instruments that may be used for the stimulation of inventive activities, and for their commercialization and diffusion. Examples of other instruments are direct and indirect financial assistance schemes, government procurement policies and tax incentives. From a firm's viewpoint, secrecy and other forms of industrial property protection such as trademarks, registered designs or copyright are complementary instruments to patents. The benefits of patenting for a firm are determined mainly by the monopoly effect of the patent and to a lesser extent by using patents as an instrument for marketing or as an information system on technological developments. Patents only become an active method of protection if an invention, in terms of technological novelty, is commercially exploitable; this is generally referred to as innovation.

2. A firm's propensity to patent is mainly determined by the expected monopoly effect of the patent. This, in turn, depends on the competitive environment, the technological opportunities and the effectiveness of the patent system. The competitive environment is characterized by a wide variety of factors, including firm size, industrial structure and concentration. Technological opportunities to patent are mainly sector specific and depend on the type of technological innovation, e.g. product or process innovation. The effectiveness of the patent system from a firm's viewpoint is mainly determined, among other things, by enforceability of patent rights.

3. Patents played a conspicuous role in the industrial development of Sweden, which was essentially based on the exploitation of domestic raw materials, such as iron ores, forests and hydroelectric power. A number of important inventions were made in the decades around the turn of the century and formed the base for the development of many major Swedish multinational firms. About half of the 12 biggest R and D spenders in industry in 1980 were initially based on a patented invention. However, successful business development based on an invention was always coupled with secondary product and process innovations and successful overall corporate management. Efforts in international marketing and foreign direct investment were prominent features of the industrial development.

4. Sweden's industrialization was largely unaided by the Government. Foreign technological influences have always been strong. Before The First World War, they originated mainly in the United Kingdom and the Federal Republic of Germany with a shift towards the United States during the interwar period. In the 1980s, Japanese influence has been growing. Today, Swedish industry has, in relation to its small market, a widely diversified portfolio of specialized and highly internationalized firms, many of which are old and large. The high degree of diversity and internationalization of industry can be seen as the combined effects of relatively large input markets (in terms of raw materials) and small output markets. Firms have been successful in absorbing foreign technology, combining it with indigenous R and D and entering international markets.

5. Industrial production as well as R and D in Sweden is highly concentrated in large firms, many of which are old. There has been a rather stable set of leading firms in Sweden and the industrial R and D concentration among the leading firms over the last two decades has increased remarkably.

6. Regarding the present role of patents in industrial innovation in Sweden, there are few conclusive studies. McQueen and Wallmark[2] have found evidence that the annual rate of major

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2 D.H. McQueen and J.T. Wallmark, *100 viktiga innovationer: Sverige 1945-1980*, (100 important innovations in Sweden 1945-1980) STU-information No. 350 (STU, Stockholm) 1983.

technological innovations in Swedish industry (in terms of generated sales) grew at an average rate of 5 per cent during the period 1945-1980. This study sheds no light on the role of patents as an instrument to stimulate innovation, but analyses the relative importance of corporate entrepreneurship. It was found that, between 1945 and 1980, new firms were created to exploit around 20 per cent of the total number of innovations. The remaining 80 per cent were generated and exploited by existing firms, mainly by the old Swedish invention-based large firms founded around the turn of the century (e.g. ASEA, Ericsson, SKF, AGA, etc.)

7. There is no sign of a declining annual rate of major innovations ('major' as conceptually opposed to technologically radical innovations) in these old, large firms. However, there is a slight tendency to an increase in the annual rate of new firms based on major innovations. There is also a slight tendency to an increase over time in the share of major innovations that form the basis for a new firm. At the same time, there seems to be an increase over time in the rate of acquisitions of small, innovation-based firms by large firms.[3] In a small sample of 13 such acquisitions made between 1960 and 1980, the median age of the small firm at the time of acquisition was 10 years.

8. To assess the relative importance of patents in Sweden's technology-based firms, a survey was carried out with corporate patent managers of nine large firms and the owners of 11 small firms. The survey was based on interviews structured in line with the questionnaire in the annex, and focused on the relative importance of patents as compared to alternative methods of intellectual property protection, past and possible future trends of the role of patents and the sensitiveness of the firm's innovative activities to possible changes in the patent system.

9. The nine large firms are transnationals in the sense of having subsidiaries in three or more countries. Five of them are among Sweden's biggest R and D spenders and belong to Sweden's 10 most frequent patent applicants. A classification into industrial sectors was made on the basis of major areas of economic activity, since the product spectrum of most of the firms is quite diversified. Five firms belong to the chemical sector, four to the mechanical sector and one to electrical engineering. All firms were headquartered in the Stockholm or Göteborg area.

10. The 11 small firms were randomly selected from a population of 32 manufacturing firms spinning off from a technical university. To allow for a comparative analysis with large firms, the small firms had to have at least one product on the market. Thus, the selected firms were established before 1980. The firms are small in the sense of having an average annual turnover of 6 million Swedish crowns and 11 employees. All but one firm are undertaking R and D and the average R and D expenditures of all firms is about 18 per cent of the total sales.

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3 See O. Granstrand, "On measuring and modelling innovative new entry in Swedish industry", in R.H. Day and G.E. Eliasson, *The Dynamics of Market Economics*, (North-Holland, Amsterdam), 1986, pp.295-310.

CHAPTER II

THE ROLE OF PATENTS IN LARGE TECHNOLOGY-BASED FIRMS

A. Patents as an instrument to prevent imitation

11. The major objective of patents, from a firm's viewpoint, is to prevent imitation and to avoid inventing around patents and reverse engineering. Secrecy is often used as an alternative to patents and may cover a wide range of means. On the question concerning which means of secrecy a particular firm used to prevent other firms from finding out about its technical innovations, the answers included:

- enforcement of an internal secrecy policy in general, including secrecy agreements;
- counterintelligence;
- delay in giving R and D information to foreign subsidiaries, salesmen and customers;
- control of access to research facilities;
- use of computer-based systems with classified reporting;
- control of publishing through externally-hired researchers;
- use of the Swedish language;
- monitoring of key R and D personnel;
- employee clauses;
- efforts to reduce outward mobility of R and D personnel;
- fragmentation of technological information.

12. In general, the firms had strengthened or were planning to strengthen secrecy policies. Emphasis was on the control of human resources, which is regarded as more important than the control of documents. Among the means of controlling R and D personnel, employee clauses were perceived as the least effective. The fragmentation of R and D work is viewed as an effective instrument for reducing the risk of spreading sensitive technological information and for lessening the negative effects if R and D key personnel leave the firm. In general, the firms regarded the control of R and D personnel as more important than the control of hardware.

13. As regards patents, the large firms stated they would apply for patents under the following circumstances:

(1) the product could be reverse engineered when it is on the market. Almost all product innovations fall into this category;

(2) the costs of reverse engineering were estimated to be low enough to provide an incentive for prospective imitators;

(3) patent infringement could be detected easily;

(4) patent rights could be enforced effectively.

They would also apply for patents to block activities of competitors, to facilitate licensing out, joint ventures or the sale of plants, and to generate a high-tech image for the company.

14. In general, it was confirmed that patents were regarded as most appropriate for the protection of product innovation, while secrecy was considered more important for process innovation. Besides determinants derived from technological opportunities and the effectiveness of the patent system, two phenomena favour patenting relative to secrecy. Firstly, in specific sectors such as pharmaceuticals and agro-chemicalls there is a growing public interest for disclosure, forcing the firms to disclose inventions publicly. Secondly, firms seem to behave collectively if one firm starts patenting in a field that was previously not covered by patents. Still, secrecy plays an important role in the process of innovation before patent applications are filed.

15. Several firms expressed the need for strengthening intellectual property protection in general since protection of innovation by other means is viewed as becoming more difficult. Some factors underlying this trend were reckoned to be increased competition, increasing internationalization of economic activities, increasing outward mobility of R and D personnel and improved methods of technology scanning.

B. Factors limiting the effectiveness of patent protection

16. The limitations as perceived by the interviewed firms are shown in table 1. As seen from the table, the chemical industry has a significantly higher number of instances where limitations are perceived. The sector-specific differences may be ascribed to the assessment of factors such as patentability, enforceability and disclosure requirements. This could result from the different technological characteristics of chemical and engineering products and the subsequent possibility of imitation once a patent is filed. Still, most firms believe it is possible to file a patent without providing sufficient information for imitation. As an interviewee put it: "It is an art to write patent applications in such a way as to receive a patent without giving away too much of the invention".

17. Compulsory licensing or cross-licensing were not regarded as limiting factors, although the firms understood that compulsory licensing might be a problem in certain developing countries. Rapid technological developments were not viewed as restricting the significance of patents.

18. Regarding the effectiveness of the patent system, the firms regarded the patent-granting process as too slow. They also found patent litigation too lengthy. They regretted the lack of international standards. Moreover, court handling of cases was criticized and the damages imposed in patent litigation trials were generally regarded as insufficient. A number of the above issues are now under review in Sweden.

19. With regard to the duration of the patent protection, it is of interest to assess the possible changes in firms' R and D behaviour if the duration is increased or reduced. Thus, each firm was asked how a hypothetical extension of the patent protection time by three years in the countries where the firm was operating would influence the size and composition of R and D budgets. Seven firms indicated that they would not change their R and D budget if the patent protection time was marginally extended. Two chemical firms said they would probably increase their R and D efforts marginally by 5 to 10 per cent, with additional efforts focused on product innovation.

C. Patenting practices and trends

20. In table 2, the patenting practices of the large firms covered in the survey are quantitatively assessed. Due to the narrowness of the sample, a statistical analysis cannot be pursued in detail. This is particularly true for sector-specific analysis. For example, the engineering industry's high number of patents as compared with the chemical industry is likely to be a result of the engineering firms' higher degree of internationalization rather than a measure of their propensity to patent.

21. The share of exploited patents differs considerably among the firms. The chemical industry has a significantly lower exploitation share as a whole. This is particularly the case for the pharmaceutical sector. In the pharmaceutical industry it is common practice to apply for patents at an early stage of the innovation process. This means that the first patent applications are filed several years before market introduction and additional patents are sought afterwards. Only a

Table 1

Limitations of the effectiveness of patents - large firms

Possible limitation	Engineering industry (n = 5)	Chemical industry (n = 4)	Total (n = 9)
Patents are unlikely to be held valid if challenged	0.5 [a]	2	2.5
Firms do not attempt to enforce patents	0	0	0
Competitors can legally invent around patents	2	2	4
Technology is moving so fast that patents are irrelevant	1.5	1	2.5
Patent documents require disclosure of too much information	0.5	3	3.5

[a] Fractions indicate partial agreement.

limited number of the patents applied for and granted are commercially exploited for the final product while those that are not exploited commercially are kept for possible future use or for defensive purposes.

22. If the patent stock is broken down into different vintages the older the patents the higher the exploitation share in general. Firms tend not to keep unexploited patents alive and most of the firms have introduced procedures for annual reviews of patents to determine whether the maintenance fees for each patent should be paid for another year. The rising patent fees have contributed to the more systematic use of screening procedures.

23. With respect to the trend analysis of patenting practices, no quantitative information was available and assessments of possible future trends are derived from reasoning and conclusions, gathered during the interviews. Some trends are summarized in table 3. Although it is difficult to discern a general trend in the likely patenting practices, some aspects indicate interesting changes.

24. Due to the rising costs of patent applications and maintenance, there seemed to be a growing consciousness of the commercial aspects of patenting. This trend is believed to be reinforced by general trends such as increased R and D costs and greater international competition as well as recent attempts by Swedish firms to expand their activities in the United States market where patents play a more important role. Within the firms, patenting decisions are more and more influenced by marketing aspects, which are complementary to the technical and legal aspects.

Table 2

Patenting practices in large firms

Variable [a]	Engineering industry (n = 5)	Chemical industry (n = 4)	Total (n = 9)
Number of patented inventions	ca 185	ca 165	ca 175
Number of patents in the firm's stock	2000-2200 (n = 3)	1100-1200 (n = 3)	1600-1700 (n = 6)
Share of patents applications for which patents are granted	82%	92%	85%
Share of patents granted that are exploited commercially [b]	75% (n = 4)	55% (n = 4)	64% (n = 8)
Average life time of a firm's patent (years)	ca 8.7 (n = 3)	ca 11.2 (n = 3)	ca 10 (n = 6)
Average number of countries for which firm patented an invention	ca 8	ca 12	ca 10
Cost of patenting operations (1984) (MSEK) [c]	ca 8.1 (n = 4)	8.5 (n = 3)	8.3 (n = 7)
R and D cost (1984) (MSEK)	225 (n = 2)	346 (n = 3)	298 (n = 5)
Cost of patenting as a percentage of R and D cost	ca 2.3% (n = 3)	2.7% (n = 3)	ca 2.5% (n = 6)
Number of patented inventions/ R and D cost (1984) in MSEK	1.1 (n = 2)	0.5 (n = 3)	0.74 (n = 5)
Share of own patents for which infringements are detected	1% (n = 3)	ca 3.3% (n = 2)	ca 1.9% (n = 5)
Number of recent patent litigations of other firms	0.6 (n = 5)	0.67 (n = 3)	0.63 (n = 8)
Number of recent patent litigations directed towards own firm	0.75 (n = 4)	0 (n = 3)	0.43 (n = 7)

a The unit of analysis is a firm, in 1985 (1984 for some variables). Due to missing data, the number of observations 'n' might vary.

b Including licensing out, but not purely defensive patents for which there is no own production or licensing out.

c MSEK = Million Swedish crowns.

Table 3

Patenting trends in large firms

Aspect	Trend	Some underlying causes
Status of patenting in the firm	Increasing	- Rising patenting costs - Internationalization - Creation of EPO [a] - Increased awareness of competitive value of patents
Patenting propensity	- Increasing in half of the firms (3 engineering 1 chemical)	- Decreasing internal and external (EPO) requirements for patenting - Increasing patent consciousness in the firm - Decreased effectiveness of secrecy
Share of patents exploited	Possibly decreasing	- More "petty patents" - Possibly more defensive patenting owing to increased awareness of competitive value of patents
Average life time of patents	Decreasing	- More regular screening of patents - Higher patent fees
Average number of countries where patents are applied for	Both increasing and decreasing	- International standards (EPO) - Rising patent application fees
Infringement cases	Increasing in some firms	- Entry into U.S. market - Increased competition (use of patents as a competitive tool)

a EPO = European Patent Office.

CHAPTER III

THE ROLE OF PATENTS IN SMALL TECHNOLOGY-BASED FIRMS

A. Patents as an instrument to prevent imitation

25. Only five out of the 11 small technology-based firms covered in the study were engaged in patenting. The most important objective of the firms in seeking patent protection was to strengthen their bargaining power in negotiations for financing, licensing or co-operation. Three firms reported that they had attributed an important role to patents when the firm was just established, but they have since then become disillusioned.

26. For the majority of the firms, patents were not considered as an effective instrument to prevent imitation. All firms relied on secrecy and on technological lead time, the latter being of particular relevance for the electronic firms. Several firms were about to strengthen secrecy measures. The small firms' secrecy measures are similar to those of the large firms, although they are less formal.

B. Factors limiting the effectiveness of patents

27. A summary of the factors which were perceived by the small firms as limiting the effectiveness of patents can be found in table 4. As only five of the 11 firms interviewed have been engaged in patenting, the statements have to be analysed cautiously. As compared to the large firms, the small firms referred more frequently to patent limitations, such as those relating to inventing around and the inadequacy of patents in relation to rapidly evolving technological developments. Although there was no empirical proof of this, shorter development times and lower technological complexity of the small firm's innovations as compared to those of the large firms could be the reasons underlying their attitude towards patenting.

28. The possible impact of the duration of patent protection on the small firm's R and D behaviour was found to be negligible. The firms indicated that there would be no increase of R and D activities if the duration of patent protection was increased. When asked whether the abolition of the patent system would have an adverse effect on the R and D budget, most of the firms were of the opinion that there would be no significant reduction in the R and D budget, while the firms engaged in patenting replied that they would adjust their research strategies by relying more on secrecy. With regard to the legal aspects of the patent system, the firms interviewed had only minor criticisms, mostly related to the high patenting fees and the lack of international standards.

Table 4

Limitations of the effectiveness of patents - small firms

	Limiting factors	Electronics firms (n = 4)	Mechanical firms (n = 5)	Chemical firms (n = 2)	Total (n = 11)
1.	New products and/or processes are not readily patentable	2	3	0	5
2.	Patents are unlikely to be held valid if challenged	1	3	1	5
3.	Firms do not attempt to enforce patents	1	1	1	3
4.	Competitors can legally invent around patents	4	3	1	8
5.	Technology is moving so fast that patents are irrelevant	4	2	0	6
6.	Patent documents require disclosure of too much proprietary information (for products)	0	1	2	3
7.	Licensing is required by court decisions or decrees	0	0	0	0
8.	Firms participate in cross-licensing agreements with competitiors	1	0	0	1

C. Patenting practices and trends

29. The patenting practices of the small firms are outlined in table 5. Sector-specific comparisons would not seem to be meaningful as only five out of the 11 firms were engaged in patenting. However, some significant differences as compared to the large firms can be discerned. The small firms showed:

- a higher number of patents per employee;
- a lower rejection rate of patent applications;
- a lower rate of commercial exploitation of patents;
- a higher number of patents per R and D Swedish crown;
- a higher proportion of the patenting costs as a part of the total R and D costs.

30. The above findings indicate that the small upstart firms were more inventive per R and D crown, less inclined to exploit a patent comercially but still more innovative in terms of number of commercialized patented innovations per R and D crown. With regards to patenting trends no new elements could be found.

Table 5

Patenting practices in small firms

Variable	Electronics firms [a] (n = 4)	Mechanical firms [b] (n = 5)	Chemical firms [c] (n = 2)	Total [d] (n = 11)
Number of patented inventions	1	5.5	10	5.5
Number of patents in the firm's stock	10	29.6	85	37 (ca)
Share of patent applications for which patents are granted	100%	93%	100%	96%
Share of patents granted that are exploited commercially	50%	100%	20%	34%
Average life time of a firm's patent (years)	5	10.8	-	9.4
Average number of countries for which firm patented an invention	10	9.5	6 (ca)	9 (ca)
Cost of patenting operations (1986) (MSEK)	0.05	0.08	0.02	0.06
R and D cost (1986) (MSEK)	1.5	0.8	0.15	0.8
Cost of patenting as percentage of R and D costs	3.3%	10%	13%	9.3%
Number of patented inventions/R and D cost (1986) in MSEK	0	(2.5) [e]	0	(1.5) [e]
Share of own patents for which infringements are detected	0	1.7%	20%	5%
Number of recent patent litigations of other firms	0	0	0	0
Number of recent patent litigations directed towards to own firm	0	0	0	0

Note:

a Only one firm has engaged in patenting. Averaging is not meaningful and the data refer to this firm only.

b Three firms engage in patenting. Data are shown for these three.

c Data for the two firms are shown separately.

d The total is related to the average of the five firms that were engaged in patenting.

e Uncertain and unrepresentative figure due to small numbers.

ANNEX

QUESTIONNAIRE

Q.1

(a) What means are used by this company to prevent other companies from finding out about its technical developments; that is, what means are used by this company to protect its proprietary technology?

(b) In your company, what is the relative effectiveness of patents vs. other means of protecting proprietary technology (which are most/least effective)?

(c) Any changes (past 5 years) in this respect and why?

Q.2

(a) To what extent does each of the following considerations limit the effectiveness of patents as a means of protecting proprietary technology:

- New products and/or processes are not readily patentable.
- Patents are unlikely to be held valid if challenged.
- Firms do not attempt to enforce patents.
- Competitors can legally invent around patents.
- Technology is moving so fast that patents are irrelevant.
- Patent documents require disclosure of too much proprietary information.
- Licensing is required by court decisions or decrees.
- Firms participate in cross-licensing agreements with competitors.

(b) Have there been any changes in the relative importance of the considerations above during the last five years, and, if so, why?

Q.3

(a) During the last five years, have there been any major changes in the company's patenting behaviour and policies, e.g. regarding:

- Patenting propensity.
- Decisions when/where/how to patent?
- The share of the company's patents that are exploited? What is the present percentage level of this share?
- The use of patent literature as an information source.
- Cost, organization and staffing of patent departments (e.g. centralization or upgrading of staff qualifications).
- The share of your company's exploited and non-exploited patents that are being subjected to infringement and litigations? What are the present percentage levels of these shares?

(b) What are the reasons behind these changes?

Q.4

During the last five years, have there been any major changes in the company's licensing behaviour and policies?

Q.5

(a) Is the protection offered by legislation, law enforcement and court practices against technology scanning performed by others directed towards this company satisfactory and, if not, why?

(b) Are major changes in this regard taking place or being expected?

(c) Do you have any suggestions in this respect?

Q.6

Assume the patent protection time stipulated by law were extended three years - what would be the impact of this change on:

- The total R and D budget of your company?
- The amount of R and D spent on products vs processes?
- The amount of R and D spent on entirely new products and processes vs the amount of R and D spent on improvements of existing products and processes of your company?

Q.7

How much in rough terms (e.g. as a percentage of R and D expenditures) does your company spend on its patenting operations?

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